WHAT IS CLAIMED IS:

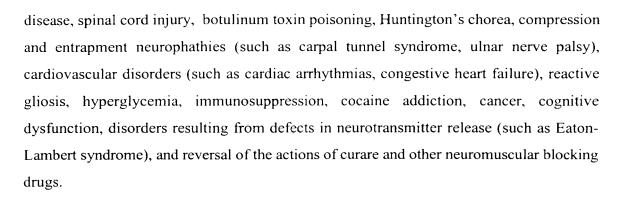
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- A substantially pure O-Superfamily conopeptide selected from the peptides set forth in 1. Table 2.
- 2. A substantially pure conotoxin peptide selected from the group consisting of the mature toxin peptide sequences disclosed in Table 1 except the peptides Di6.2, Af6.9, KK1, KK2, δ-GmVIA, M6.4, δ-PVIA, δ-PVIA-OH, δ-NgVIA, δ-TxVIA, and Israel TxVIA.
- The substantially pure conotoxin peptide of claim 2, wherein Xaa, is Glu. 10 3. 15
 - The substantially pure conotoxin peptide of claim 2, wherein Xaa, is Tyr. 4.
 - 5. The substantially pure conotoxin peptide of claim 2, wherein Xaa₄ is Trp.
 - The substantially pure conotoxin peptide of claim 2, wherein Xaa, is Gln. 6.
 - 7. The substantially pure conotoxin peptide of claim 2, wherein Xaa, is Pro.
 - 8. The substantially pure conotoxin peptide of claim 2, wherein Xaa, is hydroxy-Pro. 20
 - The substantially pure conotoxin peptide of claim 2, wherein Xaa₅ is ¹²⁵I-Tyr, mono-iodoTyr 9. or di-iodo-Tyr.
 - 10. The substantially pure conotoxin peptide of claim 2, wherein Xaa₄ is 6-bromo-Trp.
 - 11. The substantially pure conotoxin peptide of claim 2, wherein Xaa, is Gla.
 - 12. The substantially pure conotoxin peptide of claim 2, wherein Xaa, is pyro-Glu.

- 13. An isolated nucleic acid comprising a nucleic acid coding for an O-Superfamily conotoxin precursor comprising an amino acid sequence selected from the group of amino acid sequences set forth in Table 1.
- 5 14. The nucleic acid of claim 13 wherein the nucleic acid comprises a nucleotide sequence selected from the group of nucleotide sequences set forth in Table 1 or their complements.
 - 15. A substantially pure conotoxin protein precursor comprising an amino acid sequence selected from the group of amino acid sequences set forth in Table 1.

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- 16. A pharmaceutical composition comprising a conotoxin peptide or a pharmaceutically acceptable salt thereof and a pharmaceutically acceptable carrier, said conotoxin peptide being the conotoxin peptide of claim 1.
- 15 17. A pharmaceutical composition comprising a conotoxin peptide or a pharmaceutically acceptable salt thereof and a pharmaceutically acceptable carrier, said conotoxin peptide selected from the group consisting of the conotoxin peptides of claim 2.
- 18. A method for regulating the flow of sodium through sodium channels in an individual in need thereof which comprises administering a therapeutically effective amount of a conotoxin peptide of claim 1 or a pharmaceutically acceptible salt thereof.
 - 19. A method for treating or preventing disorders associated with voltage gated ion channel disorders in which comprises administering to a patient in need thereof a therapeutically effective amount of a conotoxin peptide of claim 1 or a pharmaceutically acceptible salt thereof.
- The method of claim 18, wherein said individual in need thereof suffers from a disorder selected from the group consisting of multiple sclerosis, other demyelinating diseases (such as acute disseminated encephalomyelitis, optic neuromyelitis, adrenoleukodystrophy, acute transverse myelitis, progressive multifocal leukoencephalopathy), sub-acute sclerosing panencephalomyelitis (SSPE), metachromatic leukodystrophy, Pelizaeus-Merzbacher



- 21. The method of claim 19, wherein said disorder is a neurologic disorder.
- 22. The method of claim 19, wherein said neurologic disorder is a seizure.
- 23. The method of claim 22, wherein said seizure is seizure is associated with epilepsy.
- 24. The method of claim 21, wherein said neurologic disorder is a neurotoxic injury associated with conditions of hypoxia, anoxia or ischemia.
 - 25. The method of claim 24, wherein said neurotoxic injury is associated with stroke, cerebrovascular accident, brain or spinal cord trauma, myocardial infarct, physical trauma, drownings, suffocation, perinatal asphyxia, or hypoglycemic events.
 - 26. The method of claim 19, wherein said disorder is pain.
- 27. The method of claim 26, wherein said pain is migraine, acute pain, persistent pain, neuropathic pain or nociceptive pain.
- 28. The method of claim 19, wherein said disorder is inflammation.
- 29. The method of claim 19, wherein said disorder is a cardiovascular disorder.
- 30. A method of alleviating pain which comprises administering to a mammal that is either exhibiting pain or is about to be subjected to a pain-causing event a pain-alleviating amount

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of an active agent comprising a conotoxin peptide of claim 1 or a pharmaceutically acceptible salt thereof.

- A method for treating disorders associated with radical depolarization of excitable 31. membranes by activating a KATP channel which comprises administering to an individual in need thereof an effective amount of an active agent comprising a conotoxin peptide of claim 1 or a pharmaceutically acceptible salt thereof.
 - The method of claim 31, wherein said disorder is cardiac ischemia. 32.
 - The method of claim 31, wherein said disorder is cerebral ischemia. 33.
 - The method of claim 31, wherein said disorder is asthma. 34.

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- The method of claim 31, wherein said disorder is ocular ischemia. 35.
 - A method of identifying compounds that mimic the therapeutic activity of a O-Superfamily 36. conotoxin, comprising the steps of: (a) conducting a biological assay on a test compound to determine the therapeutic activity; and (b) comparing the results obtained from the biological assay of the test compound to the results obtained from the biological assay of a O-Superfamily conotoxin.
 - A substantially pure O-superfamily-conotoxin peptide derivative comprising a permutant 37. of the peptide of claim 1.
 - A substantially pure O-superfamily-conotoxin peptide derivative comprising a permutant 38. of the peptide of claim 2.